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Sexually Transmitted Diseases: Volume 26(3) March 1999 pp 166-176

Forgetting as a Cause of Incomplete Reporting of Sexual and Drug Injection Partners [Original Articles]

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The authors thank the many individuals on the staffs of the AIDS Prevention Project, the Needle Education Outreach Network, and the RAVEN Study (all part of the Seattle-King County Department of Public Health) for their expert advice on and help with subject recruitment and other study activities. They also thank Edward Liebow and Richard Needle for encouragement to pursue this research, Megan Wood for library assistance, and the staff of the Alcohol and Drug Abuse Institute for logistical and administrative support. They are grateful to Lois Downey, Barbara Leigh, Elizabeth Loftus, John M. Roberts, Jr., Christopher Spitters, and three anonymous reviewers for their very helpful suggestions for improving earlier versions of this paper. An earlier version of this paper was presented at the 18th International Sunbelt Social Network Conference in Sitges, Spain, in May 1998. This research was supported by a research grant from the National Institute on Drug Abuse, grant number DA10640. Additional results and the interview instrument are available at URL: <http://weber.u.washington.edu/~ddbrewer/tr/std99res.html>.

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Received for publication September 30, 1998, revised December 11, 1998, and accepted December 14, 1998.

Abstract [TOP](#)

Background and Objectives: Partner notification and social network studies of background disease often involve interviewing people to elicit their sexual and/or drug injection partners. Incomplete reporting of partners in these contexts would significantly hamper efforts to understand and control the spread of sexually transmitted diseases, HIV, and other infections. There are many reasons why individuals might not name their partners in interviews. This study provides a comprehensive assessment of forgetting as a cause of incomplete reporting of sexual and injection partners.

Study Design: One hundred fifty-six persons in Seattle, Washington, at presumed high risk for HIV recalled their sexual and/or injection partners in two interviews separated by 1 week or 3 months.

Results: Repeated, nonspecific prompting elicited, on average, 10% of all partners recalled in an interview. Subjects displayed substantial forgetting of partners across partner types, recall periods, and four independent measurement approaches, with up to 72% of partners forgotten. The number of partners recalled and subjective assessment of forgetting are moderate to good predictors of the number of partners forgotten. Recalled and forgotten partners do not differ dramatically on any of several partner variables.

Conclusions: Forgetting is a primary factor in the incomplete reporting of sexual and injection partners. Interviewers should prompt repeatedly to maximize recall of partners. Reinterviewing is currently the best method available for identifying partners as completely as possible and should be focused on individuals who report many partners and/or sense they have other partners they cannot recall.

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PARTNER NOTIFICATION and social network studies of infectious disease are crucial for understanding and preventing transmission of HIV, sexually transmitted diseases (STDs), and other infections.[1-7](#) In the provider referral approach to partner notification (and variations thereof), a health professional interviews an infected patient to elicit information about his or her sexual and/or injection partners in a confidential contact interview. The health professional then attempts to locate the partners to alert them of their exposure to the infection and urge them to seek counseling, testing, and treatment (if appropriate). In social network studies of infectious disease, interviewers elicit partners from individuals at risk for an infection. By describing the structure, composition, and dynamics of personal and social networks, researchers and health officials can predict the course of an epidemic, understand the social influences on risk behavior, and target preventive interventions more efficiently.

For effective partner notification and determination of network structure, reported sexual and injection contact information must be as complete as possible, especially for individuals who have many partners and thus may contribute disproportionately to the transmission of disease.[8-11](#) Clinicians and researchers have long suspected that people often do not report their partners completely and have identified many potential reasons for this. One class of possible factors relates to consequences of the testing and notification process, including fear of reprisal/violence by partners,[12,13](#) fear of rejection by partners,[14](#) reluctance to get injection partners into trouble,[13](#) resentment toward partners who may have infected the patient,[15](#) and patients' confused emotional state brought on by the notification of test results.[16](#) Another class of potential reasons for not reporting partners involves impression management, privacy, and motivational issues, including the social undesirability of acknowledging involvement in potentially stigmatizing activities,[9,17,18](#) the code of behavior among drug injectors not to name injection partners,[13,16](#) concerns about confidentiality,[13,16,17,19,20](#) a subject's desire to keep an interview short,[21](#) and a lack of rapport with the interviewer.[22](#) A third class of possible reasons for incomplete reporting of partners consists of memory-related factors, including forgetting/memory errors,[13,15,23](#) a potentially large number of partners,[19,24,25](#) long recall periods,[17](#) a patient's perceived lack of sufficient locating information,[13](#) and anonymous or casual contact with partners.[9,19,26-28](#)

Our study focused on forgetting and memory-related factors. In our study, the recall periods were relatively long, we encouraged subjects to report all partners regardless of the amount of information they knew about them, and many subjects had a large number of partners and some anonymous/casual contact with them. The study design also eliminated or minimized the influence of other factors potentially involved with incomplete reporting of partners. Our subjects participated anonymously, and we did not test them for any infection, nor did we collect identifying information about or attempt to trace partners. In addition, we recruited subjects who attended an HIV testing clinic or participated in projects restricted to drug injectors. Therefore, upon enrollment, subjects knew that the study interviewers knew the subjects had engaged in potentially stigmatizing risky sexual and/or drug injection behavior. We also assessed the impact of subjects' possible desire to keep interviews short and lack of rapport with interviewers.

Forgetting is likely to be a factor present in all types of interviewing situations. Indeed, a sizable body of research indicates that forgetting in recall interviews is substantial for various types of social contacts (D. Brewer, unpublished observations). In conducting the study, we adopted the assumption implicit in partner notification and social network research on HIV/STD transmission that all recalled partners are valid (D. Brewer's unpublished review supports the validity of recalled social contacts).

In this article, we provide estimates of the level of forgetting of sexual and drug injection partners in recall interviews. We used several methods for measuring forgetting. The main approach involves comparing partners mentioned in one interview with those mentioned in another. We also report here on subject correlates of forgetting to identify the types of individuals who require the most intensive interviewing. Moreover, we compare recalled and forgotten partners on a variety of partner variables to gauge the epidemiologic significance of forgotten partners. To describe further the kinds of partners forgotten, we also summarize subjects' self-reported reasons for forgetting particular partners. The discussion focuses on implications for disease control and interviewing practice.

Method [TOP](#)

Subject Recruitment [TOP](#)

One hundred fifty-six persons who were presumed to be at high risk for HIV and other sexually and parenterally transmitted infections participated in the study between November, 1996, and November, 1997. We recruited subjects from three sources: the largest public HIV testing clinic in the Seattle metropolitan area ($n = 66$) (all clients attending the clinic for testing were eligible to participate in this study), an out-reach services program for gay/bisexual methamphetamine injectors ($n = 5$) (all program participants were eligible), and a large epidemiologic study[29](#) of drug injectors in the Seattle area ($n = 85$) (all subjects completing that study were eligible). No data are available on the number of eligible persons who were invited, but declined to participate in our study.

Design [TOP](#)

We designed this study to control against forward telescoping and assess forgetting of recent as well as chronologically more

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distant partners. Forward telescoping refers to when subjects recall events (e.g., partnerships) as having occurred during the recall period, although they actually occurred before the recall period.³⁰ We interviewed subjects twice according to one of two follow-up conditions. In the *short follow-up* condition, the intended interval between interviews was 1 week, whereas the mean observed interval was 11 days (median/mode = 7, SD = 10). The recall period for partner elicitation in both interviews was 2 years. For short follow-up subjects, the beginning calendar point (stated as a month and year) of the recall period remained constant in the two interviews regardless of the observed interval between interviews. In the *long follow-up* condition, the intended interval between interviews was 3 months, whereas the mean observed interval was 103 days (median = 95, SD = 36). The recall period for partner elicitation was 1 year for the first interview and 2 years for the second. During the first 8 months of data collection, we randomly assigned subjects to long and short follow-up conditions in a 2:1 ratio, respectively. During the remaining months of data collection, we assigned all subjects to the short follow-up condition to make interview scheduling efficient. Short follow-up and long follow-up subjects do not differ significantly or appreciably on any of 15 demographic and behavioral variables.

The different recall periods for the first and second interviews in the long follow-up condition eliminate forward telescoping of partners in the first interview as an explanation for partners recalled in the first but not the second interview. Furthermore, the short follow-up condition permitted assessment of forgetting of recent partners, and the long follow-up condition provided a more powerful means of measuring the true extent of forgetting by allowing memories of partners to decay during the longer interval between interviews.

In this study, we also used an experimental factorial design to evaluate the effects of subjects estimating the number of their partners before recalling them individually and subjects thinking aloud as they recalled individual partners. Neither procedure influenced the number of partners recalled significantly or meaningfully (D.D. Brewer and S.B. Garrett, unpublished observations), and, therefore, we do not discuss them further here.

Procedure [TOP](#)

The study was separate and independent from all other studies and all services provided by the recruitment sites. We each conducted private, face-to-face interviews using microcomputers in closed rooms at our study offices or at the HIV testing clinic. We interviewed two subjects by telephone for their second interviews, because they could not travel to an interview location. For each interview, subjects received a \$20 gift certificate good at one of several stores.

Subjects in the short follow-up condition participated anonymously and scheduled the second interview at the end of the first interview. Subjects in the long follow-up condition participated anonymously in the first interview. At the end of the first interview, we attempted to collect locating information for contacting them later to schedule the second interview, although they were not required to give this information to continue in the study. If a subject did provide any locating or identifying information, we destroyed it after the second interview or 6 months after the first interview, whichever came first.

Seventy-one of the 84 (85%) short follow-up subjects completed both interviews, whereas 52 of the 72 (72%) long follow-up subjects completed both interviews. Subjects who completed both interviews and subjects who completed only the first interview do not differ significantly or meaningfully on any of a host of demographic and behavioral variables, including the number of partners recalled.

Interview Content and Structure [TOP](#)

The first part of the interview included questions about subjects' demographic characteristics, drug use, and sexual behavior. In the second part of the interview, subjects recalled partners. The elicitation question for sexual partners defined sexual partners as those persons with whom the subject had genital or anal contact (i.e., all anal, manual, oral, and/or vaginal sex partners). The elicitation question for injection partners defined injection partners as those persons with whom the subject injected drugs, including those with whom the subject did and did not share needles. Therefore, injection partners include those persons with whom the subject might have had risky injection contact through needle sharing, sharing of other injection paraphernalia, syringe-mediated drug sharing, needlestick injuries/accidents, giving injections to others, or receiving injections from others³¹⁻³³ (N.M. Flynn, R. Anderson, L. Clancy, et al., unpublished observations). The elicitation questions emphasized that subjects were to list all partners in the recall period, take as much time to recall partners as necessary, and refer to partners by first names, nicknames, initials, or brief descriptions.

When a subject indicated that he or she could not recall any more partners or had been silent for an extended period (>30 seconds) during recall, the interviewer prompted with a nonspecific question about additional partners (e.g., "is there any-one else you have had sex/injected drugs with in the last year/2 years?"). The interviewer prompted in this way until the subject insisted that he or she could not recall any additional partners. Next, the interviewer read the list of partners back to the subject to ensure that all recalled partners were correctly recorded, and then the interviewer prompted the subject again. If the subject recalled other partners at a later point in the interview, the interviewer prompted the subject again.

The interviewer then asked the subject how many additional partners during the recall period he or she could not recall specifically or did not want to mention. At the end of this part of the interview, if a subject was a sexually active drug injector, the interview returned to elicitation of partners of the other type. The order of elicitation (i.e., whether sexual partners were elicited before or after the elicitation of injection partners) was balanced across subjects. In the second interview, the next part involved comparing all partners recalled in the first interview with all those recalled in the second. For partners mentioned in one interview but not both, subjects were asked why they mentioned the partner in only one interview. All other major aspects of interview content and structure were the same for first and second interviews.

The final section of the interview included questions about specific partners. Because of interview time constraints, these questions pertained to no more than the first 12 sexual/injection partners mentioned. For sexually active drug injectors with many partners of both types, the interview computer program determined at random whether questions were asked about sexual partners or injection partners only. The interview computer program also randomly assigned each subject to one of four separate subsets of questions about partners to reduce the length of the interview. Each subset included different questions about partner demographic characteristics, relationship characteristics, subjects' knowledge of locating information, and social interaction among partners. At the very end of the interview, subjects rated how uncomfortable and embarrassed the interview questions made them feel.

Coding of Self-Reported Reasons for Forgetting Particular Partners [TOP](#)

The first two authors jointly and inductively developed codes for the subjects' self-reported reasons for not mentioning (forgetting) particular partners in the second interview that they had mentioned in the first. The second author coded all responses according to this scheme, whereas the first author coded a random 25% subsample of subjects' responses. The two coders displayed generally high reliability. For the codes used by both coders (10 for forgotten sex partners and 14 for forgotten injection partners), the median kappa and phi are 0.97. All codes except one have kappas/phis greater than 0.63. Across forgotten sexual and injection partners, there are six other codes that one coder used but the other did not, and in these cases, the coder who used the code applied it to very few (1-11%) of the responses. In summarizing results, we collapsed codes that were essentially the same from a memory perspective.

Statistical Analysis [TOP](#)

We computed univariate descriptive statistics for the number of partners recalled and several measures of forgetting. We calculated Pearson correlation coefficients between various subject characteristics and selected forgetting measures. To compare recalled and forgotten partners, we also computed, within subjects, Pearson correlation coefficients between whether a partner mentioned in the first interview was recalled or forgotten in the second interview and various partner variables. Where appropriate, we used standard procedures for summarizing sets of correlation coefficients and using Pearson correlation coefficients to measure the magnitude of mean differences.[34](#)

Results [TOP](#)

Subject Characteristics and Representativeness [TOP](#)

The mean age of the subjects was 38 years (SD = 9, range, 19-65). Eighty-eight percent of the subjects had graduated high school or earned a general equivalency degree, and 28% had a 4-year college degree or more education. Sixteen percent of the subjects were black, 1% were Asian American, 2% were Hispanic, 4% were mixed, 3% were Native American, and 74% were white. Twenty-three percent considered themselves homeless, and 44% were employed at enrollment. (An unmeasured, but probably relatively small, proportion of unemployed subjects were students). Twenty-two percent of the subjects were women. Ninety-two percent of all subjects were sexually active in the 6 months before enrollment, and 59% of the subjects were heterosexual, 28% were gay men, 3% were lesbian, and 10% were bisexual. Twenty-nine percent of the women reported trading sex for money or drugs in the 1 or 2 years before enrollment (recall periods varied across subjects). Of the sexually active subjects, 49% reported having had sex once a week or more frequently in the last 6 months. Sixty percent of the subjects had injected drugs in the 2 years before enrollment. Of these, 70% reported injecting once a week or more frequently in the 6 months before enrollment, and 31% had been in drug treatment in the month before enrollment. The primary drug injected was heroin for 68%, cocaine for 13%, speedballs for 11%, and methamphetamine for 9%. Very few (8%) subjects reported having been asked to recall partners individually by a health care worker (as in partner notification) or as part of a study in the previous year.

Overall, our sample is behaviorally similar to patients with AIDS in the Seattle metropolitan area.[35](#) The 66 subjects recruited from the HIV testing clinic are a 2.75% nonrandom sample of all clinic clients tested during the recruitment period. These subjects are representative of this client population in terms of age, gender, ethnicity, education, injection drug use, and sexual orientation (i.e., sample characteristics do not differ significantly from expected values on these variables for this client population). The 85 subjects recruited from the large epidemiologic study of drug injectors are an 11.85% nonrandom sample of all eligible subjects in that larger study during the recruitment period. These 85 subjects are representative of this subject population in terms of ethnicity, education, primary drug injected, and sexual orientation. Subjects in our study included more men ($p > 0.05$) and persons receiving public assistance ($p > 0.01$) than expected.

Number of Partners Recalled [TOP](#)

[Table 1](#) shows the number of partners recalled in the first interview (distributions for the second interview are very similar). Subjects tended to mention somewhat more injection partners than sexual partners. All distributions of the number of recalled partners are skewed to the right. Short follow-up subjects recalled approximately the same number of partners in the first and second interviews (sexual partners: $r = 0.18$, $n = 66$, ns; injection partners: $r = -0.01$, $n = 43$, ns). In both interviews, subjects overall reported little discomfort or embarrassment (means range between 1.28 and 1.40 on a 4-point scale).

Partner Type	n	Mean	Median	Mode(s)
Sex partners				
Short follow-up (2 yrs)	78	8.31	4.00	1
Long follow-up (1 yr)	65	6.89	3.00	1
Injection partners				
Short follow-up (2 yrs)	51	10.94	9.00	4
Long follow-up (1 yr)	42	12.36	9.50	1,12

Note: The recall periods for the different follow-up conditions are in p

TABLE 1. Number of Sexual and Injection Partners Recalled in the First Interview, by Follow-up Condition

Extent of Recall Over Course of Interview [TOP](#)

Across interviews and partner types, subjects recalled a notable proportion of their partners after the interviewer began prompting. On average, approximately 5% of all partners mentioned in an interview were recalled between the interviewer's first prompt and when the interviewer began reading back the list of partners. Another 5% on average were recalled after the interviewer began reading back the list, but before the question about how many partners were not recalled. Two percent, on average, were recalled at later points in the interview. Therefore, subjects recalled approximately 10% of all partners mentioned in an interview in response to prompting and reading back the list of partners. Other analysis shows that prompting and reading back the list elicit moderately more partners (in absolute and proportional terms) for subjects who recalled many rather than few partners before the first prompt (data not shown).

Levels of Forgetting of Partners [TOP](#)

Forgetting was prominent in our recall interviews as indicated by four independent measurement approaches. The first approach is a test-retest method that involves comparing, for each subject, all partners recalled in the first interview with all those recalled in the second interview. Because the recall periods for the first interview in both follow-up conditions referred to calendar periods that were embedded in the recall period for the second interview, partners recalled in the first interview but not the second can be considered to have been forgotten in the second interview. Although subjects on average recalled essentially equal numbers of partners in each interview, they tended to recall somewhat different sets of partners in each interview. Measures of forgetting based strictly on comparing partners mentioned in two interviews likely give underestimates of the true extent of forgetting, because partners who are forgotten in both interviews are not considered in the calculations (D. Brewer, unpublished observations).

In the second interview, approximately half of all sexually active subjects forgot at least one sexual partner mentioned in the first interview. Approximately 70% of drug injectors in the second interview forgot at least one injection partner mentioned in the first interview. Across follow-up conditions, subjects in the second interview forgot a mean of one to four sex partners and three to five injection partners mentioned in the first interview.

These numbers of forgotten partners are considerable in proportional terms (see [Table 2](#)). In the second interview, sexually active subjects in the short and long follow-up conditions forgot 14% and 25%, respectively, of the sexual partners they mentioned in the first interview, on average (measure A in [Table 2](#)). (For all the proportional measures we present, the proportional level of forgetting is simply the complement of the proportional level of recall). In the second interview, drug injectors in the short and long follow-up conditions forgot 22% and 39%, respectively, of the injection partners they mentioned in the first interview, on average.

Measure	n	Mean	Median
Sexual Partners			
Short follow-up condition			
A) Number in common between interviews/ Number in 1st interview	67	0.86	1.00
B) Proportion increase in number unique from 1st to 2nd interviews	66	0.20	0
C) Number in 1st interview/(number in 1st interview + number S-estimated unrecalled in 1st interview)	70	0.90	1.00
Long follow-up condition			
A) Number in common between interviews/ number in 1st interview	46	0.75	0.93
C) Number in 1st interview/(number in 1st interview + number S-estimated unrecalled in 1st interview)	61	0.93	1.00
Injection partners			
Short follow-up condition			
A) Number in common between interviews/ number in 1st interview	43	0.78	0.86
B) Proportional increase in number unique from 1st to 2nd interviews	43	0.34	0.21
C) Number in 1st interview/(number in 1st interview + number S-estimated unrecalled in 1st interview)	42	0.86	1.00
Long follow-up condition			
A) Number in common between interviews/ number in 1st interview	29	0.61	0.58
C) Number in 1st interview/(number in 1st interview + number S-estimated unrecalled in 1st interview)	37	0.87	1.00

Note: Summaries for measure C exclude subjects who were uncertain whether

TABLE 2. Selected Measures of Forgetting

Just as subjects mentioned some partners in the first interview whom they forgot in the second, short follow-up subjects recalled approximately the same number of other partners in the second interview whom they forgot in the first, excluding new partners first encountered between interviews (data not shown). (No such comparisons are possible for subjects in the long follow-up condition because of the particular recall periods and interval between interviews). For short follow-up subjects, the mean proportional increase in the cumulative total number of unique (different) partners identified by a subject from the first to the second interview is 20% for sexual partners and 34% for injection partners (measure B in [Table 2](#)). That is, subjects recalled

additional partners in the second interview whom they forgot to mention in the first interview, resulting in a larger total number of partners identified. Other test-retest measures of forgetting for the short follow-up subjects (e.g., the proportion of all unique partners identified in the two interviews who were recalled in a particular interview) show very similar results to those in [Table 2](#) (data not shown).

Overall, subjects forgot absolutely and proportionally more injection partners than sexual partners. In addition, for both sexual and injection partners, the level of forgetting is greater for long follow-up subjects than short follow-up subjects.

A second, independent method of measuring forgetting is based on comparing the aggregated number of all partners recalled by short follow-up subjects with an estimate of the aggregated number of *new* partners for a comparable recall period. This estimate is scaled-up from the number of new partners encountered between interviews (i.e., partners with whom a subject had first sexual/injection contact *after* the first interview). We identified new partners from subjects' responses about why a partner mentioned in the second interview was not mentioned in the first.

In the short follow-up condition, there are data available on the number of new partners between interviews for 62 sexually active subjects and 41 drug injectors. For each of these subjects, we scaled up an estimate of the number of new partners for the 2-year recall period with the following formula: $(730 / \text{number of days between interviews}) \times \text{number of new partners between interviews}$. This procedure is likely to produce highly inaccurate estimates at the individual level, because short periods are not necessarily very representative of a particular individual's long-term pattern of accruing new partners. However, this procedure should provide a fairly reliable estimate at the aggregate level if the rate of accruing new partners during the period between interviews can be assumed to be representative of the previous 2 years for these subjects as a whole (or at least not to be greater than the rate of accruing new partners for the previous 2 years overall).

The aggregate proportional recall measure based on the number of new partners represents the sum of the total number of unique partners mentioned by short follow-up subjects in one or both interviews divided by the sum of the scaled-up estimates of the number of new partners for the same 2-year period. These proportions are 0.40 for sex partners and 0.28 for injection partners. Although these proportions indicate that the majority of partners were forgotten (i.e., not mentioned in *any* interview) for the 2-year recall period, they are still likely to be underestimates, because subjects had their first sexual/injection contact with some partners more than 2 years before the interviews. In other words, the number of *new* partners for a given period is often less than the *total* number of partners for the period (D.D. Brewer, J.J. Potterat, S.B. Garrett, S.Q. Muth, J.M. Roberts, and R.B. Rothenberg, unpublished observations).

The third approach to measuring forgetting involves comparing recalled partners with subjects' diary logs of partners. For three subjects, all gay men, we were able to compare the sex partners recalled with diary-type or telephone number lists of sex partners these subjects kept for reasons independent of the study. All comparisons with the lists were made at the end of the second interview. One long follow-up subject kept his list for the 3-month period between his interviews. In the second interview, he recalled 89% (8/9) of his sex partners on the list. Two short follow-up subjects kept lists for longer periods, but reported that their lists were incomplete. The proportions of sex partners on the lists who were recalled in either or both interviews for these subjects are 0.74 (29/39) and 0.89 (24/27). These proportions are somewhat lower than the corresponding test-retest proportional recall measures for these subjects.

The final method for measuring forgetting focuses on subjects' assessments of how complete their recalls were. A significant proportion of subjects thought they had or might have had other partners during the recall period whom they could not recall in an interview. Across interviews and follow-up conditions, 25% to 41% of sexually active subjects reported thinking they had or might have unrecalled sexual partners. Similarly, across interviews and follow-up conditions, 45% to 56% of drug injectors said they had or might have unrecalled injection partners. On average, subjects estimated that they had forgotten several partners in the first interview (means range between 3-28 across follow-up conditions and partner types). However, the subjective proportional recall measure representing the number of partners recalled in the first interview divided by the sum of recalled and subject-estimated unrecalled partners (measure C in [Table 2](#)) indicates less forgetting on average than the test-retest proportional recall measure (measure A). Also in contrast to the test-retest measure, the subjective proportional measure shows essentially equal levels of forgetting for short and long follow-up subjects. Both the test-retest and subjective measurement approaches, however, indicate that forgetting is greater for injection partners than sex partners. The subjective measures based on second interview data yield nearly identical results. Furthermore, very few subjects reported reluctance to name partners for reasons other than forgetting. Across interviews and partner types, only 1% to 4% of subjects said that they had one or more partners whom they did not want to mention.

Subject Correlates of Forgetting [TOP](#)

To describe individual differences in forgetting among subjects, we calculated the Pearson correlations between memory-related, demographic, behavioral, and contextual variables and selected test-retest forgetting measures. We computed the correlations separately for short and long follow-up subjects and then calculated a weighted (by *n*) mean of the two correlations for a particular independent variable.

There are reasonably good predictors of the absolute number of partners forgotten in an interview (i.e., partners mentioned in one interview, but not the other). The number of partners *recalled* in the second interview is moderately positively associated with the number *forgotten* in the second interview, $r = 0.67$ ($n = 117$) for sexual partners and $r = 0.53$ ($n = 75$) for injection partners. The corresponding correlations between the number recalled and the number forgotten in the first interview for short follow-up subjects are 0.66 ($n = 67$) for sexual partners and 0.36 ($n = 43$) for injection partners.

A subject's sense of whether he or she is forgetting any partners is also a moderate to good predictor of the number of

forgotten partners in an interview. (Note that forgotten partners here are "recallable" because they were mentioned in one interview). In the second interview, this sense correlates with the number of partners forgotten in that interview who were mentioned in the first interview, $r = 0.56$ ($n = 117$) for sexual partners and $r = 0.27$ ($n = 75$) for injection partners. The corresponding correlations between a subject's sense of whether there are or might be additional unrecalled partners in the first interview and number forgotten in the first interview for short follow-up subjects are 0.89 ($n = 67$) for sexual partners and 0.24 ($n = 43$) for injection partners. Across interviews and partner types, 81% to 86% of subjects who said they had additional partners they could not recall did in fact have other partners they recalled in the other interview (or in the same interview, after their making a judgment about whether they had additional unrecalled partners). Eighteen percent to 59% of subjects who said they did *not* have additional unrecalled partners, however, also recalled additional partners in the other interview.

There are no strong correlates of the proportion of partners mentioned in the first interview who were recalled in the second (see [Table 3](#)). Because this is a proportional measure, obtained correlations cannot be explained by a predictor variable's relationship with the absolute number of partners recalled. For sexually active drug injectors, there may be a general "forgetfulness for partners" factor, as the proportional recall measures for sexual and injection partners are moderately positively related. A subject's judgment that there are or might be forgotten partners also correlates slightly to modestly negatively with the proportional recall measure. The number of very recent new partners (number of new partners first encountered between interviews for short follow-up subjects) is moderately negatively associated with the proportional recall measure. This means that subjects with many recent new partners forgot proportionally more of their partners than subjects with no or few recent new partners. However, gender, sexual orientation, apparent alcohol or drug intoxication, and the number of partners recalled in the second interview did not correlate meaningfully with the proportional recall measure. Drug injectors and subjects who do not inject drugs also are *equally* likely to forget sexual partners. Furthermore, other results indicate that socially disadvantaged subjects (who had relatively little education and were homeless, unemployed, receiving public assistance, and nonwhite) were slightly more likely to forget partners than more advantaged subjects (r 's range between -0.29 and -0.07 across partner types). Seventeen other demographic, behavioral, and contextual variables (age, wakefulness, mood, embarrassment, discomfort, whether sexually active, sex frequency, primary injected drug, injection frequency, drug treatment, overlap of sex and injection partners, time between interviews, time of day, and interviewer-rated honesty, resistance, tension, and drug-related withdrawal) show only negligible to mild associations (r 's $< .28$) with the proportional recall measure.

Variable	Pearson Correlation With Proportional Recall Measure For:	
	Sex Partners	Injection Partners
Proportional recall of sex partners	—	0.43 ^b (62)
Number of injection/sex partners recalled ¹	−0.07 (113)	−0.09 (72)
Subject's judgment of whether any forgotten partners ^{1,2}	−0.39 ^c (111)	−0.18 (72)
Female gender ²	0.02 (113)	0.08 (72)
Heterosexual orientation ²	−0.12 (112)	0.20 (72)
Drug injection in last 2 years ^{1,2}	0.00 (113)	—
Interviewer-rated intoxication ¹	−0.04 (110)	−0.12 (72)
Number of new injection/sex partners between interviews	−0.40 ^b (37)	−0.37 ^a (41)

Note. Sample sizes are in parentheses.

¹In second interview.

²Dichotomous, where yes = 2 and no = 1.

^a $p < 0.05$.

^b $p < 0.01$.

^c $p < 0.001$.

TABLE 3. Selected Subject Correlates of the Proportion of Partners Mentioned in the First Interview Who Were Recalled in the Second Interview

Comparisons Between Recalled and Forgotten Partners [TOP](#)

We computed Pearson correlations for each subject between whether a partner mentioned in the first interview was recalled or forgotten in the second interview and each of a number of partner, partnership, and network variables (locatability, frequency of sexual/injection contact, time since first and last sexual/injection contact, time since last met, relationship closeness, feelings toward partner, whether recalled before first prompt in first interview, and risky injection contact). We also calculated matrix correlations to assess whether recalled and forgotten partners form distinct subgroups or the core and periphery of a subject's sexual/injection network. Then, we summarized correlations across subjects for each variable by partner type. These correlations are based on the first 12 partners recalled by a subject in the first interview and partner variables as measured in the first interview. The partners included in these analyses represent, on average, 92% of sexual partners and 89% of injection partners recalled by a subject in the first interview. For sexual and injection partners alike, recalled and forgotten partners do not differ substantially on any variable examined. All mean correlations are less than |0.29|. We found similar results when we compared, for short follow-up subjects, partners recalled and forgotten in the first interview.

[Table 4](#) shows the mean proportions of partners mentioned in the first interview who were recalled in the second (measure A from [Table 2](#)) for epidemiologically and psychologically important categories of partners. The means are based on relatively few subjects, because different sets of subjects were asked different questions, and some subjects had no partners in particular

categories (e.g., partners in last month). The levels of recall for most categories of partners tend to be some-what higher than the levels reported in [Table 2](#). However, the proportions in [Table 4](#) cannot be compared directly with those in [Table 2](#), because the subjects summarized in [Table 4](#) are random subsamples of the whole study sample and their proportions are based only on the first 12 partners recalled in the first interview. Relatively few recent contacts were forgotten, although recall is still noticeably incomplete even for partners with whom the most recent contact was within the last 3 months. In short, forgotten partners include partners who are epidemiologically and personally important.

Category	Short Follow-up Condition		Long Follow-up Condition	
	n	Mean	n	Mean
Sexual partners				
Likely locatable ^a	4	0.87	5	0.7
Multiple sexual contacts with partner	28	0.91	16	0.8
Sexual contact in last month	6	0.92	—	—
Sexual contact in last 3 months	12	0.93	—	—
Sexual contact in last 6 months ^b	14	0.90	6	0.8
Close relationship (>5 on 1–9 scale)	15	0.96	6	0.9
Good feelings toward partner	36	0.94	17	0.8
Bad feelings toward partner	12	0.78	10	0.8
Injection partners				
Likely locatable ^a	3	0.74	5	0.6
Risky injection	8	0.86	6	0.6
Multiple injection contacts with partner	21	0.90	11	0.7
Injection contact in last month	9	0.94	—	—
Injection contact in last 3 months	11	0.88	—	—
Injection contact in last 6 months ^b	12	0.91	4	0.8
Close relationship (>5 on 1–9 scale)	11	0.91	4	0.8
Good feelings toward partner	19	0.94	12	0.7
Bad feelings toward partner	15	0.89	8	0.4

^aSubject knows partner's last name, address, and/or telephone number.

^bRefers to the period 3 to 6 months before the second interview for subjects in the long follow-up condition.

TABLE 4. Proportion of Partners Mentioned in the First Interview Who Were Recalled in the Second Interview for Particular Categories and Injection Partners

Self-Reported Reasons for Forgetting Particular Partners [TOP](#)

For both sexual and injection partners, the most common self-reported reason for forgetting particular partners in the second interview who were mentioned in the first is "don't know/just forgot/no reason," which accounts for 22% of forgotten sexual partners and 31% of forgotten injection partners. Fifty-two percent of subjects who forgot sexual partners and 69% of subjects

who forgot injection partners listed this reason for at least one forgotten partner. Another common reason for forgetting both types of partners is that the most recent contact (social or otherwise) with the forgotten partner was a relatively long time ago (variably defined across subjects). A third common reason for forgetting sexual partners is that contact with the forgotten partner was marked by a bad, sad, or painful memory or experience. Many other reasons were given, but they accounted for small proportions (<10%) of forgotten partners and/or were listed by less than 10% of subjects. We obtained very similar results on self-reported reasons for forgetting partners in the first interview who were mentioned in the second.

Subjects occasionally made spontaneous comments about forgotten partners indicating surprise that they forgot them, because they expected such partners would be easily recalled. Four percent or more of subjects made the following comments (which accounted for a small percentage of forgotten partners): recently saw forgotten sex/injection partner, frequent injection contact with forgotten injection partner, and forgotten injection partner is socially tied to a recalled injection partner. These comments reinforce the results in [Table 4](#) that indicate subjects may forget epidemiologically and personally significant partners.

Discussion [TOP](#)

Summary of Main Results [TOP](#)

Repeated prompting and reading back the list of recalled partners after the subject indicated she or he was finished recalling elicited a noteworthy proportion of additional partners. Four independent methods of measurement show that the level of forgetting of sexual and injection partners is substantial and may even be quite high. All of our methods for measuring forgetting, however, likely produce underestimates of the true extent of forgetting. By all measurement approaches, forgetting was greater for injection partners than sexual partners. The number of partners recalled and a subject's assessment of forgetting are moderate to good predictors of the absolute number of partners forgotten. However, there are few good predictors of the proportional level of forgetting. Partners mentioned in the first interview who were recalled in the second interview do not differ dramatically from those who were forgotten in the second interview on any of several partner, partnership, and network characteristics. Furthermore, subjects forgot many epidemiologically and personally significant partners. These results are remarkably consistent with research on forgetting of social contacts in recall interviews (D. Brewer, unpublished observations).

Elimination of Other Explanations for Incomplete Reporting of Partners [TOP](#)

Our design removed or minimized the influence of factors other than forgetting that might be involved in the incomplete reporting of partners. The results also suggest that social desirability and related factors did not play a role in the incomplete reporting we observed. For example, the proportional level of recall is not related to the number of partners recalled. The relationship between these variables would be substantially more negative, however, if some subjects consciously limited their reports to a certain small subset of partners in both interviews. In addition, very few subjects reported having any partners they did not want to mention and only four subjects acknowledged that they had intentionally not reported a partner in an interview when asked why they had mentioned the partner in one interview but not the other (for a total of eight such partners). Furthermore, a large percentage of subjects acknowledged having partners they could not recall specifically.

Subjects' first interviews lasted essentially as long as their second interviews (1st interview mean = 33 minutes, 2nd interview mean = 36 minutes, for the 14 subjects who completed the study before an extra series of questions was added to the second interview). This suggests that any desire subjects might have had to shorten the interview did not affect either the length of time they spent in the interviews or, presumably, the level of their reporting of partners. The level of rapport between interviewers and subjects also did not seem to figure in the incomplete reporting in our study. Subjects reported very low levels of discomfort and embarrassment and recalled a similar number of partners in each interview (for those with the same recall period in both interviews). Subjects' tension, honesty, and resistance, as rated by interviewers, bear no relationship to the proportional level of recall. Moreover, subjects' level of apparent intoxication does not account for incomplete reporting of partners, as it, too, is unrelated to the proportional level of recall. In sum, forgetting is the only plausible explanation for our results.

Implications for Understanding and Controlling Disease Transmission [TOP](#)

Forgetting of partners may obscure transmission patterns and structures, especially at the local level. For instance, if an individual linking otherwise unconnected clusters, or components, of infected or at-risk persons is forgotten, public health researchers and officials may miss important data on how an infection spread (or could spread) and lose a potentially critical prevention opportunity. Similarly, forgetting may result in underestimating the overall density of sexual and/or injection ties among a set of individuals (i.e., ratio of number of observed ties to number of all possible ties) and other measures of network connectedness.[36](#) These measures indicate how likely an infectious agent such as HIV will spread in a population.[10,37](#)

Delayed or no notification of forgotten partners may prolong an epidemic by allowing an infection to spread further. It is possible that many persons who are unaware of their infection or risk are not being notified, or are not being notified as quickly as might happen, because they were forgotten in contact interviews. Undoubtedly, certain partners may not be notified because some patients consciously withhold reporting them in contact interviews (D.L. Richter, L.L. Lindley, L.C. Sanchez, et al., unpublished observations) or because patients are unable to provide sufficient locating information for some partners whom they do report. Nevertheless, it seems quite likely that "recallable" partners are forgotten in contact interviews even though patients might be willing to report them and provide locating information if they were to recall them. Although many forgotten partners may be eventually notified as partners to subsequent infected patients who do recall them in contact interviews,[38](#) missed opportunities for notification, treatment, and education because of forgetting would serve to extend the duration and scope of an epidemic.

Implications for Interviewing Practice [TOP](#)

Our results suggest that interviewers should prompt repeatedly and read back the list of partners to the subject/patient to maximize the recall of partners. Individuals can recall additional partners beyond points in an interview where health researchers and professionals often stop attempting to collect data (e.g., when an individual says he or she can recall no more).

In this study, reinterviewing increased recall substantially. Our results indicate that reinterviewing may be most productive (although not exclusively) with individuals who recall many partners in an interview and/or believe that they may have additional unrecalled partners. In our study, these individuals were moderately more likely to recall other partners in another interview than individuals who recalled few partners and/or believed that they had no additional partners. Individuals with many recent new partners also were more likely to forget recallable partners than individuals with few or no recent new partners. This may reflect "retroactive interference," which occurs when more recently learned information (recent new partners) interferes with the recall of information learned earlier (less recent or longer-standing partners). Individuals with many recent new partners might also be given high priority for reinterviewing.

Reinterviewing has long been a recommended³⁹⁻⁴⁶ and effective⁴⁷⁻⁵⁷ procedure for eliciting additional partners. Our study shows that, in a research setting at least, this increase in partners elicited can be accounted for by partners who are forgotten in the first interview, but not the second (the phenomenon of "reminiscence"⁵⁸).

Enhancing Recall of Partners [TOP](#)

Given the degree of forgetting we have documented, it is crucial to develop techniques to enhance the recall of partners. In the areas of eyewitness and food recall, interviewing techniques based on established principles of event memory increase recall substantially without any increase in the rate of errors^{24,59-61}. Further work is required to describe how partners are organized in memory,⁶² develop supplementary interviewing techniques based on these cognitive structures, and evaluate the effectiveness of these procedures in enhancing recall of partners.

References [TOP](#)

1. Benenson AS. Control of communicable diseases manual. Washington, DC: American Public Health Association, 1995:577. [\[Context Link\]](#)
2. Fenton KA, Peterman TA. HIV partner notification: taking a new look. *AIDS* 1997; 11:1535-1546. [\[Fulltext Link\]](#) [\[CrossRef\]](#) [\[Context Link\]](#)
3. Rothenberg RB, Potterat JJ. Partner notification for STD/HIV. In: Holmes KK, Sparling PF, Mardh P-A, et al., eds. Sexually transmitted diseases. New York: McGraw-Hill, 1998. [\[Context Link\]](#)
4. Toomey KE, Cates WJ. Partner notification for the prevention of HIV infection. *AIDS* 1989; 3:S57-S62. [\[Medline Link\]](#) [\[CrossRef\]](#) [\[Context Link\]](#)
5. West GR, Stark KA. Partner notification for HIV prevention: a critical reexamination. *AIDS Educ Prev* 1997; 9:68-78. [\[Context Link\]](#)
6. Friedman SR, Neaigus A, Jose B, et al. Sociometric risk networks and risk for HIV infection. *Am J Public Health* 1997; 87:1289-1296. [\[Context Link\]](#)
7. Klovdahl AS, Potterat JJ, Woodhouse DE, Muth JB, Muth SQ, Darrow WW. Social networks and infectious disease: the Colorado Springs study. *Soc Sci Med* 1994; 38:78-88. [\[Context Link\]](#)
8. Haraldsdottir S, Gupta S, Anderson RM. Preliminary studies of sexual networks in a male homosexual community in Iceland. *J Acquir Immune Defic Syndr* 1992; 5:374-381. [\[Context Link\]](#)
9. Neaigus A, Friedman SR, Goldstein M, Ildefonso G, Curtis R, Jose B. Using dyadic data for a network analysis of HIV infection and risk behaviors among injecting drug users. In: Needle RH, Coyle SL, Genser SG, Trotter RT, eds. Social networks, drug abuse, and HIV transmission. Rockville, MD: National Institute on Drug Abuse, 1995:20-37. [\[Context Link\]](#)
10. Potterat JJ, Rothenberg RB, Muth SQ. Network structural dynamics and infectious disease propagation. *Int J STD AIDS*. In press. [\[Context Link\]](#)
11. Rothenberg RB, Potterat JJ. Strategies for management of sex partners. In: Holmes KK, Mardh PA, Sparling PF, Wiesner PJ, eds. Sexually transmitted diseases. New York: McGraw-Hill Information Services Company, 1990:1081-1086. [\[Context Link\]](#)
12. North RL, Rothenberg KH. Partner notification and the threat of domestic violence against women with HIV infection. *N Engl J Med* 1993; 329:1194-1196. [\[CrossRef\]](#) [\[Context Link\]](#)
13. Rogers SJ, Tross S, Doino-Ingorsol J, Weisfuse I. Partner notification with HIV-infected drug users: results of formative research. *AIDS Care* 1998; 10:415-429.

[\[CrossRef\]](#) [\[Context Link\]](#)

14. Spencer N, Raevsky C, Wolf F, Simms C. Sexually transmitted disease (STD) clinic client opinions on HIV partner notification. Abstract W.A.P. 85. Paper presented at: Fifth International Conference on AIDS; June 4-9, 1989; Montreal, Quebec.

[\[Context Link\]](#)

15. Ennes HJ, Bennett TG. The contact-education interview. *Am J Syphilis Venereal Dis* 1945; 29:647-666.

[\[Context Link\]](#)

16. Crystal S, Dengelegi L, Beck P, Dejowski E. AIDS contact notification: initial program results in New Jersey. *AIDS Educ Prev* 1990;2: 284-295.

[\[Medline Link\]](#) [\[Context Link\]](#)

17. Landis SE, Schoenbach VJ, Weber DJ, et al. Results of a randomized trial of partner notification in cases of HIV infection in North Carolina. *N Engl J Med* 1992; 326:101-106.

[\[Context Link\]](#)

18. Latkin CA, Vlahov D, Anthony JC. Socially desirable responding and self-reported HIV infection risk behaviors among intravenous drug users. *Addiction* 1993; 88:517-526.

[\[CrossRef\]](#) [\[Context Link\]](#)

19. Capinski TZ, Urbanczyk J. Value of re-interviewing in contact tracing. *Br J Venereal Dis* 1970; 46:138-140.

[\[Context Link\]](#)

20. Centers for Disease Control (CDC). Notification of syringe-sharing and sex partners of HIV-infected persons. *MMWR Morb Mortal Wkly Rep* 1995; 44:202-204.

[\[Context Link\]](#)

21. Friedman SR, Jose B, Neaigus A, et al. Consistent condom use in relationships between seropositive injecting drug users and sex partners who do not inject drugs. *AIDS* 1994; 8:357-361.

[\[CrossRef\]](#) [\[Context Link\]](#)

22. Buchwald J, Omura J, Larsen GI, Heely PI. The venereal disease contact interview. *Public Health Rep* 1960; 75:1000-1006.

[\[Context Link\]](#)

23. Curtis R, Friedman SR, Neaigus A, Jose B, Goldstein M, Idefonso G. Street-level drug markets: network structure and HIV risk. *Soc Networks* 1995; 17:229-249.

[\[Context Link\]](#)

24. Fisher RP, Quigley KL. Applying cognitive theory in public health investigations: enhancing food recall with the cognitive interview. In: Tanur JM, ed. Questions about questions: inquiries into the cognitive bases of surveys. New York: Russell Sage Foundation, 1992:155-169.

[\[Context Link\]](#)

25. McLaws M-L, Oldenburg B, Ross MW, Cooper DA. Sexual behavior in AIDS-related research: reliability and validity of recall and diary measures. *J Sex Res* 1990; 27:265-281.

[\[Context Link\]](#)

26. Andrus JK, Fleming DW, Harger DR, et al. Partner notification: can it control epidemic syphilis? *Ann Intern Med* 1990; 112:539-543.

[\[Context Link\]](#)

27. Friedman SR. Promising social network research results and suggestions for a research agenda. In: Needle RH, Coyle SL, Genser SG, Trotter RT, eds. Social networks, drug abuse, and HIV transmission. Rockville, MD: National Institute on Drug Abuse, 1995:196-215.

[\[Context Link\]](#)

28. Rothenberg RB, Potterat JJ, Woodhouse DE, Darrow WW, Muth SA, Klovdahl AS. Choosing a centrality measure: epidemiologic correlates in the Colorado Springs study of social networks. *Soc Networks* 1995; 17:273-297.

[\[Context Link\]](#)

29. Hagan H, McGough JP, Thiede H, Weiss NS, Hopkins S, Alexander ER. Syringe exchange and risk of infection with Hepatitis B and C viruses. *Am J Epidemiol*. In press.

[\[Context Link\]](#)

30. Prohaska V, Brown NR, Belli RF. Forward telescoping: the question matters. *Memory* 1998; 6:455-465.

[\[Context Link\]](#)

31. Hunt N. Incidence of needlestick injuries among people who inject. *Addiction* 1997; 92:219-221.

[\[CrossRef\]](#) [\[Context Link\]](#)

32. Normand J, Vlahov D, Moses LE. Preventing HIV Transmission: The Role of Sterile Needles and Bleach. Washington, D C: National Academy Press, 1995:24-27.

[\[Context Link\]](#)

33. Kral AH, Bluthenthal RN, Erringer EA, Lorvick J, Edlin BR. "Doctors" and "patients": risk behaviors among IDUs who give injections to or receive injections from other drug users. *Addiction*. In press.

[\[Context Link\]](#)

34. Rosenthal R. Meta-analytic procedures for social research. Newbury Park: Sage, 1991.

[\[Context Link\]](#)

35. Seattle/King Co. Dept. of Pub. Health. HIV/AIDS quarterly epidemiology report, second quarter 1998. Seattle: Seattle/King Co. Dept. of Public Health and Washington St. Dept. of Health, 1998.
[\[Context Link\]](#)
36. Wasserman RF, Faust K. Social network analysis: methods and applications. Cambridge: Cambridge University Press, 1994.
[\[Context Link\]](#)
37. Kretzschmar M, Wiessing LG. Modelling the spread of HIV in social networks of injecting drug users. *AIDS* 1998; 12:801-811.
[\[Context Link\]](#)
38. Potterat JJ, Meheus A, Gallwey J. Partner notification: operational considerations. *Int J STD AIDS* 1991; 2:411-415.
[\[Medline Link\]](#) [\[Context Link\]](#)
39. Brown WJ, Donohue JF, Axnick NW, Blount JH, Ewen NH, Jones OG. Syphilis and other venereal diseases. Cambridge, MA: Harvard University Press, 1970:47.
[\[Context Link\]](#)
40. Centers for Disease Control (CDC). Venereal Diseases Branch field manual. Atlanta: Centers for Disease Control, Venereal Disease Branch, 1962.
[\[Context Link\]](#)
41. Centers for Disease Control (CDC). Venereal disease epidemiology. Atlanta: Centers for Disease Control, 1973.
[\[Context Link\]](#)
42. Centers for Disease Control (CDC). HIV partner notification standards and guidelines. Atlanta: Centers for Disease Control, 1992.
[\[Context Link\]](#)
43. Centers for Disease Control (CDC). Guidelines for STD/HIV control program operations. Atlanta: Centers for Disease Control, 1992.
[\[Context Link\]](#)
44. Centers for Disease Control (CDC). STD employee development guide. Atlanta: Centers for Disease Control, 1992.
[\[Context Link\]](#)
45. Fiumara NJ. Describing a contact of venereal diseases. *Am J Syphilis Gonorrhea Venereal Dis* 1949; 33:380-388.
[\[Context Link\]](#)
46. Hoffman RE, Spencer NE, Miller LA. Comparison of partner notification at anonymous and confidential HIV test sites in Colorado. *J Acquir Immune Defic Syndr* 1995; 8:406-410.
[\[Context Link\]](#)
47. Bradshaw WVJ. Homosexual syphilis epidemic. *Tex Med J* 1961; 57:907-909.
[\[Context Link\]](#)
48. Centers for Disease Control (CDC). Alternative case-finding methods in a crack-related syphilis epidemic-Philadelphia. *MMWR Morb Mortal Wkly Rep* 1991; 40:77-80.
[\[Medline Link\]](#) [\[Context Link\]](#)
49. Doering VE, Elste G, Lehmann-Franken E, Kleinecke R. Verbesserung der Infektionsquellenforschung bei Erkrankten an Gonorrhoe durch Wiederholungsbefragungen. *Dermatologische Monatsschrift* 1979; 165:41-45.
[\[Context Link\]](#)
50. Ghani AC, Ison CA, Ward H, et al. Sexual partner networks in the transmission of sexually transmitted diseases: an analysis of gonorrhea cases in Sheffield, UK. *Sex Transm Dis* 1996; 23:498-503.
[\[Fulltext Link\]](#) [\[CrossRef\]](#) [\[Context Link\]](#)
51. Hammar H, Ljungberg L. Factors affecting contact tracing of gonorrhea. *Acta Dermato-venereologica* 1972; 52:1081-1086.
[\[Context Link\]](#)
52. Kaufman RE, Blount JH, Jones OG. Current trends in syphilis. *Public Health Rep* 1974; 3:175-196.
[\[Context Link\]](#)
53. Parker M, Ward H, Day S. Sexual networks and the transmission of HIV in London. *J Biosoc Sci* 1998; 30:63-83.
[\[CrossRef\]](#) [\[Context Link\]](#)
54. Smith DC, Brumfield WAJ. Tracing the transmission of syphilis. *JAMA* 1933; 101:1955-1957.
[\[Context Link\]](#)
55. Stuart J. Venereal disease contact investigation. *J Venereal Dis Info* 1951; 18:242-247.
[\[Context Link\]](#)
56. Webster B, Shelley EI. Studies in the epidemiology of primary and secondary syphilis in New York City. *Am J Public Health* 1941; 31:1199-1205.
[\[Context Link\]](#)
57. Wykoff RF, Heath CW, Hollis S, et al. Contact tracing to identify human immunodeficiency virus infection in a rural community. *JAMA* 1988; 259:3563-3566.
[\[Context Link\]](#)
58. Brown W. To what extent is memory measured by a single recall? *J Exp Psychol* 1923; 6:377-382.
[\[Context Link\]](#)

59. Fisher RP, Geiselman RE. Memory-enhancing techniques for investigative interviewing: The cognitive interview. Springfield, IL: Charles C. Thomas, 1992.

[\[Context Link\]](#)

60. Fisher RP, Geiselman RE, Amador M. Field test of the cognitive interview: enhancing the recollection of actual victims and witnesses of crime. J Appl Psychol 1989; 74:722-727.

[\[Context Link\]](#)

61. Fisher RP, McCauley MR, Geiselman RE. Improving eyewitness testimony with the Cognitive Interview. In: Ross D, Reed JD, Toglia M, eds. Adult eyewitness testimony: current trends and development. New York: Springer-Verlag, 1994:245-269.

[\[Context Link\]](#)

62. Brewer DD. The social structural basis of the organization of persons in memory. Hum Nature 1995; 6:379-403.

[\[Context Link\]](#)

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Citing Articles [TOP](#)



Agreement in Reported Sexual Partnership Dates and Implications for Measuring Concurrency.

Sexually Transmitted Diseases. 33(5):277-283, May 2006.

Brewer, Devon D. PhD *; Rothenberg, Richard B. MD +; Muth, Stephen Q. BA ++; Roberts, John M. Jr PhD [S]; Potterat, John J. BA [/]

[\[Abstract\]](#) [\[Fulltext\]](#) [\[PDF \(332 K\)\]](#)

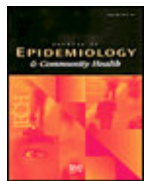


Randomized Trial of Supplementary Interviewing Techniques to Enhance Recall of Sexual Partners in Contact Interviews *.

Sexually Transmitted Diseases. 32(3):189-193, March 2005.

Brewer, Devon D. PhD *; Potterat, John J. BA +; Muth, Stephen Q. BA ++; Malone, Patricia Z. BA [S]; Montoya, Pamela BA [S]; Green, David L. BA [S]; Rogers, Helen L. BA [S]; Cox, Patricia A. [S]

[\[Abstract\]](#) [\[Fulltext\]](#) [\[PDF \(220 K\)\]](#)



A glossary of terms for navigating the field of social network analysis.

Journal of Epidemiology & Community Health. 58(12):971-975, December 2004.

Hawe, Penelope 1; Webster, Cynthia 2; Shiell, Alan 1

[\[Abstract\]](#) [\[Fulltext\]](#) [\[PDF \(76 K\)\]](#)



Risk network structure in the early epidemic phase of HIV transmission in Colorado Springs.

Sexually Transmitted Infections. 78 Supplement 1:i159-i163, April 2002.

Potterat, J J 1; Phillips-Plummer, L 1; Muth, S Q 1; Rothenberg, R B 2; Woodhouse, D E 1; Maldonado-Long, T S 1; Zimmerman, H P 1; Muth, J B 1

[\[Abstract\]](#) [\[Fulltext\]](#) [\[PDF \(162 K\)\]](#)



Gonorrhoea and chlamydia core groups and sexual networks in Manitoba.

Sexually Transmitted Infections. 78 Supplement 1:i145-i151, April 2002.

Jolly, A M 1; Wylie, J L 2

[\[Abstract\]](#) [\[Fulltext\]](#) [\[PDF \(218 K\)\]](#)



Sex Partner Concurrency: Measurement, Prevalence, and Correlates Among Urban 18-39-Year-Olds.

Sexually Transmitted Diseases. 29(3):133-143, March 2002.

MANHART, LISA E. MPH *; ARAL, SEVGI O. PhD +; HOLMES, KING K. MD, PhD *; FOXMAN, BETSY PhD ++

[\[Abstract\]](#) [\[Fulltext\]](#) [\[PDF \(75 K\)\]](#)



Evaluation of Interviewing Techniques to Enhance Recall of Sexual and Drug Injection Partners.

Sexually Transmitted Diseases. 28(11):666-677, November 2001.

BREWER, DEVON D. PhD; GARRETT, SHARON B. MA

[\[Abstract\]](#) [\[Fulltext\]](#) [\[PDF \(140 K\)\]](#)



Sampling Individuals With Large Sexual Networks: An Evaluation of Four Approaches.

Sexually Transmitted Diseases. 28(4):200-207, April 2001.

JOLLY, ANN M. PhD *;+ **AND**; WYLIE, JOHN L. PhD ++[S]

[\[Abstract\]](#) [\[Fulltext\]](#) [\[PDF \(58 K\)\]](#)



Partner Concordance in Reports of Joint Risk Behaviors.

JAIDS Journal of Acquired Immune Deficiency Syndromes. 25(2):173-181, October 1, 2000.

Bell, David C.; Montoya, Isaac D.; Atkinson, John S.

[\[Abstract\]](#) [\[Fulltext\]](#) [\[PDF \(122 K\)\]](#)

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